We claim:

1. A composition consisting essentially of a cationic, lipophilic, water-soluble molecule, and an anionic ligand for a cellular receptor.

2. The composition of claim 1, wherein the anionic ligand is a ligand for the allosteric site of hemoglobin.

3. The composition of claim 2, wherein the anionic ligand is an inositol polyphosphate.

4. The composition of claim 3, wherein the anionic ligand is inositol hexaphosphate.

5. The composition of claim 1, wherein the cationic, lipophilic, water-soluble molecule comprises a guanidinium moiety.

6. The composition of claim 5, wherein the cationic, lipophilic, water-soluble molecule is a sterol comprising at least one guanidinium moiety.

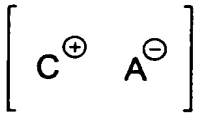
7. The composition of claim 5, wherein the cationic, lipophilic, water-soluble molecule is BGTC or BGSC.

8. The composition of claim 2, wherein the cationic, lipophilic, water-soluble molecule comprises a guanidinium moiety.

9. The composition of claim 3, wherein the cationic, lipophilic, water-soluble molecule is a sterol comprising at least one guanidinium moiety.

10. The composition of claim 4, wherein the cationic, lipophilic, water-soluble molecule is BGTC or BGSC.

11. A compound represented by generalized structure 1:



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wherein

C+ represents a lipophilic water-soluble molecule bearing at least one positive charge; and

A- represents a ligand for a mammalian cellular receptor, wherein said ligand bears at least one negative charge.

12. The compound of claim 11, wherein A- is a ligand for the allosteric site of hemoglobin.

13. The compound of claim 11, wherein C+ comprises at least one cationic functional group selected from the group consisting of guanidinium, imidazolium, 1,2-diammoniumethylene, 1,8-diammoniumnaphthyl, and 2,2'-bipyridinium.

14. The compound of claim 11, wherein C+ comprises at least one guanidinium moiety.

15. The compound of claim 11, wherein C+ comprises two guanidinium moieties.

16. The compound of claim 11, wherein C+ comprises at least one cationic functional group selected from the group consisting of guanidinium, imidazolium, 1,2-diammoniumethylene, 1,8-diammoniumnaphthyl, and 2,2'-bipyridinium; and A- is a ligand for the allosteric site of hemoglobin.

17. The compound of claim 11, wherein C+ comprises at least one guanidinium moiety; and A- is a ligand for the allosteric site of hemoglobin.

18. The compound of claim 11, wherein C+ comprises two guanidinium moieties; and A- is a ligand for the allosteric site of hemoglobin.

19. A compound consisting essentially of a lipophilic water-soluble molecule, wherein said lipophilic water-soluble molecule comprises at least one guanidine or guanidinium moiety; and a second molecule comprising at least one carboxylic acid, phosphoric acid, phosphonic acid, sulfuric acid, or sulfonic acid moiety.

20. The compound of claim 19, wherein said second molecule comprises at least one carboxylic acid or phosphoric acid moiety.

21. The compound of claim 19, wherein said second molecule is a phosphorylated inositol.

22. The compound of claim 19, wherein said second molecule is IHP.

23. The compound of claim 19, 20, or 21, wherein said second molecule is a ligand for the allosteric site of hemoglobin.

24. The compound of claim 19 or 20, wherein said lipophilic water-soluble molecule is a sterol.

25. The compound of claim 24, wherein said second molecule is a phosphorylated inositol.

26. The compound of claim 25, wherein said second molecule is IHP.

27. The compound of claim 24, wherein said second molecule is a ligand for the allosteric site of hemoglobin.

28. The compound of claim 25, wherein said second molecule is a ligand for the allosteric site of hemoglobin.

29. The compound of claim 24, wherein said sterol is cholesterol.

30. The compound of claim 25, wherein said sterol is cholesterol.

31. The compound of claim 26, wherein said sterol is cholesterol.

32. The compound of claim 29, wherein said second molecule is a ligand for the allosteric site of hemoglobin.

33. The compound of claim 30, wherein said second molecule is a ligand for the allosteric site of hemoglobin.

34. The compound of claim 24, wherein said lipophilic water-soluble molecule is BGSC or BGTC.

35. The compound of claim 25, wherein said lipophilic water-soluble molecule is BGSC or BGTC.

36. The compound of claim 26, wherein said lipophilic water-soluble molecule is BGSC or BGTC.

37. The compound of claim 34, wherein said second molecule is a ligand for the allosteric site of hemoglobin.

38. The compound of claim 35, wherein said second molecule is a ligand for the allosteric site of hemoglobin.

39. The compound of claim 24, wherein said lipophilic water-soluble molecule is BGTC.

40. The compound of claim 25, wherein said lipophilic water-soluble molecule is BGTC.

41. The compound of claim 26, wherein said lipophilic water-soluble molecule is BGTC.

42. The compound of claim 39, wherein said second molecule is a ligand for the allosteric site of hemoglobin.

43. The compound of claim 40, wherein said second molecule is a ligand for the allosteric site of hemoglobin.

44. A method of enhancing oxygen delivery to a tissue or organ of a mammal, comprising the step of:

administering to said mammal a composition or compound according to claim 1 or 11.

45. A method of enhancing oxygen delivery to a tissue or organ of a mammal, comprising the step of:

administering to said mammal red blood cells previously treated with a composition or compound according to claim 1 or 11.

46. A method of treating a mammal afflicted with anemia, coronary infarction, pulmonary disease, congestive heart failure, myocardial infarction, stroke, peripheral vascular disease, intermittent claudication, circulatory shock, hemorrhagic shock, chronic hypoxia, respiratory alkalemia, metabolic alkalosis, sickle cell anemia, reduced lung capacity, gangrene, anaerobic infections, carbon monoxide poisoning, nitric oxide poisoning, or

cyanide poisoning comprising the step of:

administering to said mammal a composition or compound according to claim 1 or 11.

47. A method of treating a mammal afflicted with anemia, coronary infarction, pulmonary disease, congestive heart failure, myocardial infarction, stroke, peripheral vascular disease, intermittent claudication, circulatory shock, hemorrhagic shock, chronic hypoxia, respiratory alkalemia, metabolic alkalosis, sickle cell anemia, reduced lung capacity, gangrene, anaerobic infections, carbon monoxide poisoning, nitric oxide poisoning, or cyanide poisoning, comprising the step of:

administering to said mammal red blood cells previously treated with a composition or compound according to claim 1 or 11.

48. A method of improving the oxygen delivering capability of mammalian blood, comprising the step of:

adding to said mammalian blood a composition or compound according to claim 1 or 11.

49. A method of incorporating a therapeutically useful substance into mammalian red blood cells, comprising the step of:

treating said mammalian red blood cells with a composition or compound according to claim 1 or 11, wherein said composition or compound comprises said therapeutically useful substance.